

Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R4PRMGn

Northern Mixed Grass Prairie

General Information

Contributors (additional contributors may be listed under "Model Evolution and Comments")

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Vegetation Type

Grassland

Dominant Species*

AGSM KOMA
STIPA BUDA
BOUTE
CAFI

General Model Sources

- Literature
 Local Data
 Expert Estimate

LANDFIRE Mapping Zones

30 39
31 40
33

Rapid Assessment Model Zones

- California Pacific Northwest
 Great Basin South Central
 Great Lakes Southeast
 Northeast S. Appalachians
 Northern Plains Southwest
 N-Cent.Rockies

Geographic Range

Northeastern Montana, western North and South Dakota, northeastern Wyoming, western Nebraska.

Biophysical Site Description

Elevations range from 1,300 to 4,000 feet. Temperatures range between extremes of hot summers and cold winters that are typical of a continental climate. Precipitation increases from west (12 in.) to east (24 in.). Two-thirds of the precipitation occurs during the growing season. Soils vary, but are generally aridicols in the west and mollisols in the east. Soils in the northern Great Plains, west of the Missouri River in the Dakotas, northwestern Nebraska, northeastern Wyoming and Montana are formed from sandstone and shales. These soils range from clayey, fine-loamy, to fine silty soils of mixed origin in level and hilly-undulating lands with major contributions from loess, eolian sand, alluvium, and mountain outwash.

Vegetation Description

This vegetation type is characterized by the dominance of cool-season grasses such as western wheatgrass and needlegrasses. Warm-season grasses like grama grasses and buffalo grass are common and usually increase in dominance following heavy disturbance. Needleleaf sedge is very common throughout this vegetation type, especially in sandy soils. Needleleaf sedge tends to be very drought-resistant.

Disturbance Description

The northern mixed-grass prairie is strongly influenced by wet-dry cycles. Fire, grazing by large ungulates and small mammals such as prairie dogs and soil disturbances (i.e. buffalo wallows and prairie dog towns) are the major disturbances in this vegetation type. From instrumental weather records, droughts are likely to occur about 1 in every 10 years. Historically, there were likely close interactions between fire and grazing since large ungulates tend to be attracted to post-fire communities. Average fire intervals are estimated at 8-25 years, although in areas with very broken topography fire intervals may have been greater than 30 years.

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

Fires were most common in July and August, but probably occurred from about April to September. Seasonality of fires influences vegetation composition. Early season fires (April - May) tend to favor warm-season species, while late season fires (August - September) tend to favor cool-season species. Replacement fire in our model does remove 75% of the above ground cover as assumed in the literature. However, we don't think loss of the above ground cover by the replacement fire will necessarily induce a retrogression back to an earlier seral stage because the main component of dominant grasses remains unharmed to insure the continuity of the seral stage. We used 3 levels of native ungulate grazing intensities: heavy with at least 80% biomass removal, moderate with about 60% removal, and light with 40% or less removal. We assumed that light grazing would not alter the community enough to change classes, but increasing grazing intensity would move the community back to earlier stages.

Adjacency or Identification Concerns

This PNVG transitions to tallgrass prairie to the east, sagebrush steppe to the west, and sandhills prairie, shortgrass prairie and southern mixed-grass prairie to the south. In the western part of this PNVG, big sagebrush can invade with heavy grazing or absence of fire. Cheatgrass currently is increasing in portions of this PNVG.

This PNVG is similar to the PNVG R0PGRn from the Northern and Central Rockies model zone.

Scale Description

Sources of Scale Data Literature Local Data Expert Estimate

Historically, fires probably ranged in size from 1000s to 10,000s of acres. The variation depends on build-up of fuels which were influenced by precipitation and grazing. Extent of weather influences (wet-dry cycles) would have been very widespread.

Issues/Problems

Model Evolution and Comments

Ortmann in his review, suggested that in addition to fire, drought and grazing, insect outbreaks (Rocky Mountain locust) would have impacted all classes.

Succession Classes
Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 29%

Early1 Open

Description

Very short-stature vegetation resulting from prairie dog disturbance. A variety of forb species such as fetid marigold, scarlet globemallow, and curlycup gumweed tend to dominate this class. Common grass species include purple three-awn, buffalo grass, and saltgrass. Greasewood may be present in lowland areas. Fringed sagebrush can also be a component of this class. The fuels in this class are generally too sparse to carry fire.

Indicator Species* and Canopy Position

- DYPA Upper
- GRSQ Upper
- SPCO Upper
- ARPU9 Upper

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	30 %
Height	Herb Short <0.5m	Herb Short <0.5m
Tree Size Class	no data	

Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

Class B 12%

Early2 Open

Description

Grasses such as buffalo grass, blue grama, dropseeds, and upland sedges dominate this class. Forbs like scarlet globemallow, scarlet gaura, skeleton weed, and dotted gayfeather are common in this class. Prickly pear, man sage, fringed sage, and broom snakeweed occur in this class. Prickly pear tends to increase with heavy grazing.

Indicator Species* and Canopy Position

BUDA Upper
BOGR2 Upper
CAFI Upper
SPORO Upper

Upper Layer Lifeform

- Herbaceous
 Shrub
 Tree

Fuel Model 1**Structure Data (for upper layer lifeform)**

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	15 %	45 %
<i>Height</i>	Herb Short <0.5m	Herb Short <0.5m
<i>Tree Size Class</i>	no data	

- Upper layer lifeform differs from dominant lifeform.
Height and cover of dominant lifeform are:

Class C 18%

Mid1 Open

Description

Blue grama, western wheatgrass, needlegrasses, prairie junegrass, upland sedges, and little bluestem are common grasses. In some areas species such as big bluestem, sand bluestem, prairie sandreed and bluebunch wheatgrass are locally common. Common forbs include scurfpea, prairie coneflower, Rocky Mountain beeplant, scarlet globemallow, and dotted gayfeather. Prickly pear, man sage (*Artemisia ludoviciana*), fringed sage, snowberry and broom snakeweed occur in this class.

Indicator Species* and Canopy Position

BOGR2 Mid-Upper
AGSM Upper
STIPA Upper
CAFI Middle

Upper Layer Lifeform

- Herbaceous
 Shrub
 Tree

Fuel Model 1**Structure Data (for upper layer lifeform)**

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	30 %	60 %
<i>Height</i>	Herb Short <0.5m	Herb Medium 0.5-0.9m
<i>Tree Size Class</i>	no data	

- Upper layer lifeform differs from dominant lifeform.
Height and cover of dominant lifeform are:

Class D 25%

Late1 Open

Description

Vegetation community in this class is very similar to Class C, although western wheatgrass and needlegrasses are the most common species. In some areas western wheatgrass forms dense stands. Fewer forbs occur in this class than in Class C. Prairie junegrass is more common in this class than previous classes.

Indicator Species* and Canopy Position

AGSM Upper
STIPA Upper
CAFI Middle
BOGR2 Mid-Upper

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	50 %	80 %
Height	Herb Short <0.5m	Herb Tall > 1m
Tree Size Class	no data	

Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class E 16%

Late2 Closed

Description

Vegetation community is similar to Class D but needle grasses tend to be more prevalent, especially during years with wet springs. Forbs are sparse. Litter layer tends to be relatively thick and continuous.

Indicator Species* and Canopy Position

STIPA Upper
AGSM Upper
BOGR Mid-Upper
CAFI

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	80 %	100 %
Height	Herb Short <0.5m	Herb Tall > 1m
Tree Size Class	no data	

Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Disturbances

Non-Fire Disturbances Modeled

- Insects/Disease
- Wind/Weather/Stress
- Native Grazing
- Competition
- Other: prairie dog disturbance
- Other: drought + grazing

Fire Regime Group: 2

- I: 0-35 year frequency, low and mixed severity
- II: 0-35 year frequency, replacement severity
- III: 35-200 year frequency, low and mixed severity
- IV: 35-200 year frequency, replacement severity
- V: 200+ year frequency, replacement severity

Historical Fire Size (acres)

Avg: 10000
Min: 1000
Max: 100000

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class. All values are estimates and not precise.

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Sources of Fire Regime Data	<i>Avg FI</i>	<i>Min FI</i>	<i>Max FI</i>	<i>Probability</i>	<i>Percent of All Fires</i>	
<input checked="" type="checkbox"/> Literature	<i>Replacement</i>	15	8	25	0.06667	67
<input type="checkbox"/> Local Data	<i>Mixed</i>	30	15	35	0.03333	33
<input checked="" type="checkbox"/> Expert Estimate	<i>Surface</i>					
	<i>All Fires</i>	10			0.10001	

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